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Trajectory and determinants of agreement between parental and physicians' reports of childhood atopic dermatitis

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Abstract

Background: Parent self-administered reports are commonly used in studies on childhood atopic dermatitis (AD) but data on its validity are sparse. We aimed to examine the agreement between parent- and physician-reported measures of childhood AD throughout early life and identify the determinants.

Methods: In this prospective cohort study, we used data of 449 infants and their mothers recruited in the Ulm SPATZ Health Study in Germany. Longitudinal data of parental and children's caring physicians' reports were used to assess the point and cumulative agreement of parent- and physician-reported AD diagnoses, AD onset age, and trend of agreement at child ages between 1 and 6 years overall and by child and parent demographics and health conditions. A Generalized Estimating Equation model was fitted to identify factors associated with the sensitivity of parent reports.

Results: The point agreement between parent- and physician-reported AD was substantial at the age of 1 (kappa = 0.63, 95% CI: 0.51–0.75) but declined with age and became fair after the age of 3 (kappa < 0.40). The cumulative agreement remained moderate at the age of 6 (kappa = 0.51, 95% CI: 0.43–0.60). Parents had a bias towards delayed reporting of the AD onset age. The AD severity was the only strong determinant for the agreement of AD diagnoses and largely explained the variance of the sensitivity of parent reports.

Conclusion: The disagreement between parent- and physician-reported AD increases with child age, likely due to the change of AD severity. Using parent-reported data might miss a substantial portion of mild childhood AD cases.

KEYWORDS
agreement, atopic dermatitis, parental report, physician report, recall bias, severity

1 | INTRODUCTION

Atopic dermatitis (AD) is a common inflammatory skin disease, which often develops in early life.[1] AD incidence peaks in childhood and then declines with age.[2] Observational studies on childhood AD epidemiology brought about varying results.[3] The reported 1-year AD prevalence of children aged ≤5 years ranged from 8.7% to 19.8% in high-income countries.[4–6] Besides differences in ethnicity, environmental factors and methodology in study design, there are multiple information sources on AD in these studies, including

parent-reported data, physician-reported data, registries and health claim data, which could be important contributors to the observed heterogeneity.

Parent-reported AD diagnosis is the most common information source in epidemiological studies on AD.[7] But pediatric conditions may be poorly recognized and recalled by parents.[8] Although several studies have investigated the childhood AD diagnosis agreement among different clinical assessment criteria,[9–11] regarding the agreement between parent- and physician-reported AD, we are only aware of a side note in one of our own publications of the Ulm Birth Cohort Study (UBCS) in Germany.[12] We documented that there was only a fair agreement (kappa = 0.36) between the parent-reported (14.8%) and the physician-reported (26.0%) cumulative lifetime AD incidence up to the age of 4 years.[12]

There remains a paucity of evidence for important measures other than cumulative lifetime AD incidence in epidemiological studies, e.g., the age-specific AD point prevalence, the AD onset age, and whether there is a patient age-related trend in agreement. Literature on determinants of agreement between self-reported and physician-reported chronic conditions among adult patients suggests there is a better agreement in examining severe and life-threatening diseases (e.g., cancers).[13] Patients' age, sex, education, and socioeconomic status were also associated with the agreement level.[14,15] We are unaware of any study on the main determinants of the agreement between parent- and physician-reported childhood AD.

Filling those knowledge gaps can have implications for assessing and controlling systematic errors such as information bias (especially misclassification) in studies describing childhood AD distribution and exploring exposure-disease associations. We therefore aimed to examine the agreement between parent- and physician-reported measures of AD and its trajectory in early life. A further aim was to explore whether important risk factors for developing AD which may influence parents' awareness of children's health conditions, e.g., parental atopy, comorbid atopic and infectious diseases, and filaggrin gene mutations[16,17] would have an impact on the agreement. We used longitudinal birth cohort data up to the age of 6 years from the Ulm SPATZ Health Study and sought to validate our results using a second study, the UBCS.

Key messages

Compared with physician-reported data, using parent-reported data to measure childhood atopic dermatitis distribution is likely to miss a substantial portion of mild cases at an early age. The disagreement level between parent and physician reports increases with children's age, which may be largely attributed to the change of AD severity over time.

2 | METHODS

2.1 | Study design and study population

The Ulm SPATZ Health Study recruited 970 mothers and their 1006 newborn infants after delivery between April 2012 and May 2013 in the University Medical Centre Ulm, Germany. The cohort included mothers aged ≥18 years at that time, knowing the German language, and having inpatient delivery. Infants and mothers transferred to intensive care after delivery were excluded. Mothers completed baseline questionnaires regarding demographics, education, socioeconomic status, and lifestyle factors during pregnancy. Cord blood was also collected shortly after delivery, centrifuged, and stored at −80°C. Later, DNA extraction and genotyping was performed. Follow-up questionnaires were sent to parents annually to obtain further information including children's health conditions. From the child age of 1 year onwards, questionnaires were also sent in parallel to children's primary care physicians to obtain separate physician-reported information on clinical history. For this analysis, we used longitudinal information on AD from questionnaires completed by parents and physicians at children ages between 1 and 6 years (Year 1 to Year 6). The Ethics Committee of Ulm University approved the study protocol (No. 311/11).

2.2 | Measures

At each follow-up, child AD was defined as an affirmative response to the question "was atopic dermatitis diagnosed by a doctor for the child in the previous 12 months" on self-administered questionnaires sent on the child's birthday and answered separately by the parents and the caring physician. We assessed the point agreement between parent- and physician-reported AD at each follow-up, as well as, the cumulative agreement defined as the agreement for whether children were ever reported having AD at or before that follow-up. At each follow-up, we included the children in the analysis if (i) the interval between their birthday and parental completion of the questionnaires was ≤30 days and (ii) the interval between parental and the physician's completion of the questionnaires was ≤30 days. Besides, we compared the first year of life in which AD diagnosis was reported (AD onset age) by parents and physicians. We also calculated the sensitivity of parent-reported AD, i.e., the proportion of physician-reported AD diagnoses which were also reported by parents, as well as, specificity, positive, and negative predictive values of parent reports.

We used parent-reported information on potential time-fixed and time-varying determinants of agreement of parent- and physician-reported AD. Time-fixed factors included child sex, maternal education at baseline (high: duration of school education >11 years vs. low: ≤11 years), maternal nationality at baseline (German vs. others), maternal smoking in the year before pregnancy (yes vs. no), any parental atopic disease (yes vs. no), and child filaggrin gene mutations (yes vs. no). According to previous literature,[17,18] we considered having any one of the R501X, 2282del4, R2447X, and S3247X filaggrin

gene mutations associated with developing AD. Time-varying child-related factors in the last 12 months at each follow-up included other atopic disease diagnoses (yes vs. no based on questions about hay fever, asthma, urticaria, food allergies or other allergies) and frequency of parent-reported fever episodes (<2 vs. ≥2). From age 2 years onwards, time-varying parent-reported children's skin conditions measured by the Patient-Oriented Eczema Measure (POEM) score at the time of completing parental questionnaires (continuous variable, 0–28, mild symptoms: <8, moderate symptoms: 8–19, and severe symptoms: >19)[19–21] were available.

2.3 | Validation study

To validate findings, we used comparable data in the UBCS,[12] which is another birth cohort study recruiting 1090 newborn infants and their mothers after delivery between November 2000 and November 2001 in Ulm by similar means. Separate annual parent- and physician-reported AD diagnoses were available for ages 1 through 4 years. POEM scores were not assessed within UBCS while all other potential determinants matched the SPATZ assessments; similarities of the two cohorts were described elsewhere.[22]

2.4 | Statistical analysis

We estimated the point and cumulative agreement between parent- and physician-reported childhood AD at each follow-up using Cohen's Kappa coefficient and calculating 95% confidence intervals (CI). We examined the trends in point and cumulative agreement over the age from 1 to 6 years. We assessed the AD report agreement overall and stratified it by time-fixed factors. We also assessed the agreement stratified by the time-varying factors at each time point and examined the trend.

We conducted a sensitivity analysis to compare the point agreements with regard to the aforementioned time intervals between birthday, parental, and physician reports using cut-offs of 21-day and 42-day instead of the aforementioned 30-day.

For AD onset age, we calculated the weighted Cohen's Kappa for the agreement; a Bangdiwala's Observer Agreement Chart was used to illustrate the direction of parental report bias.[23]

A further analysis was to investigate the associations between important potential determinants of agreement identified in the stratified analysis and the sensitivity of parent-reported AD. To account for the correlation of repeated measures for a child at each time point, we used a multivariable Generalized Estimating Equation (GEE) log-binomial model with an autoregressive correlation structure. The GEE model was run among the children with physician-reported AD and the dependent variable was parent-reported AD (yes vs. no), i.e., the sensitivity of parent-reported AD. We also evaluated the proportion of variance of sensitivity of parent-reported AD that was explained by the covariates in the GEE model using a marginal R^2 statistic.[24,25]

All statistical analyses were performed with SAS, version 9.4 (SAS Institute, Cary, NC).

3 | RESULTS

Table 1 shows the characteristics of mothers and children included in the analyses for Year 1 and Year 6. Parents reported AD diagnoses in fewer children than the physicians. A total of 449 children were included in the Year 1 analysis (Figure 1). During the follow-ups, gradual drop-out and exclusion due to the 30-day interval led to a total of 222 children for the Year 6 analysis. However, the distributions of basic demographic characteristics were quite similar at Year 1 and Year 6 (Table 1). Figure 2 depicts the distribution of parent-reported POEM scores from Year 2 to Year 6. There was no obvious pattern of

TABLE 1 Characteristics of mothers and children included in the study at Year 1 and 6

Characteristics	*N* (%) at Year 1	*N* (%) at Year 6
Total	449 (100)	222 (100)
Male children	221 (49)	107 (48)
Children with atopic dermatitis diagnosis in the past year		
Reported by parents	32 (7)	12 (5)
Reported by physicians	55 (13)	17 (8)
Children with other atopic diseases in the past year	42 (10)	20 (9)
Children with filaggrin mutation	41 (11)	14 (7)
Fever in the last year		
Children had fevers less than two times	242 (54)	107 (49)
Children had fevers twice or more	205 (46)	113 (51)
Any parent with atopic diseases	257 (58)	120 (55)
Mother with German nationality	410 (92)	200 (91)
Mother with higher education level	306 (68)	144 (65)
Mother smoked in the year before pregnancy	83 (18)	48 (22)

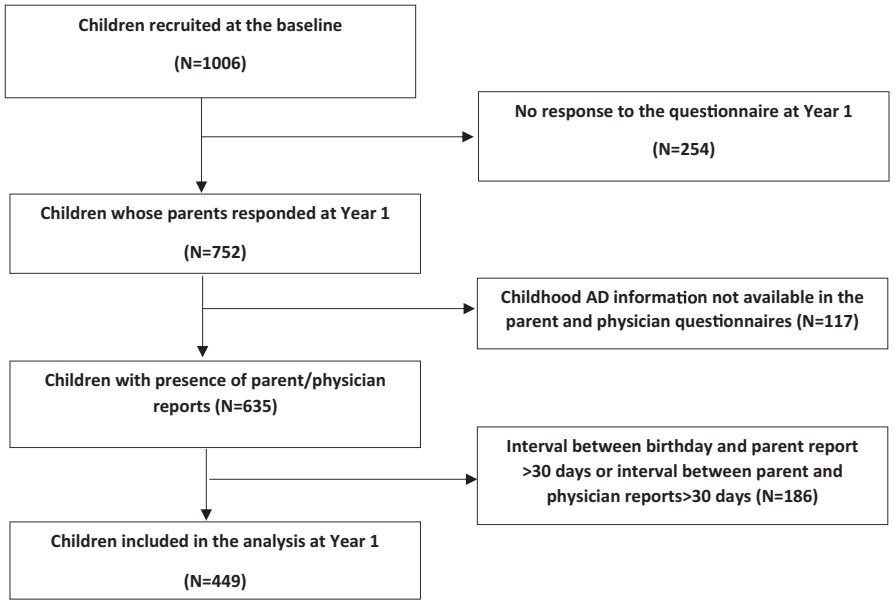

FIGURE 1 Flow chart for the inclusion of study population. Abbreviation: AD, atopic dermatitis

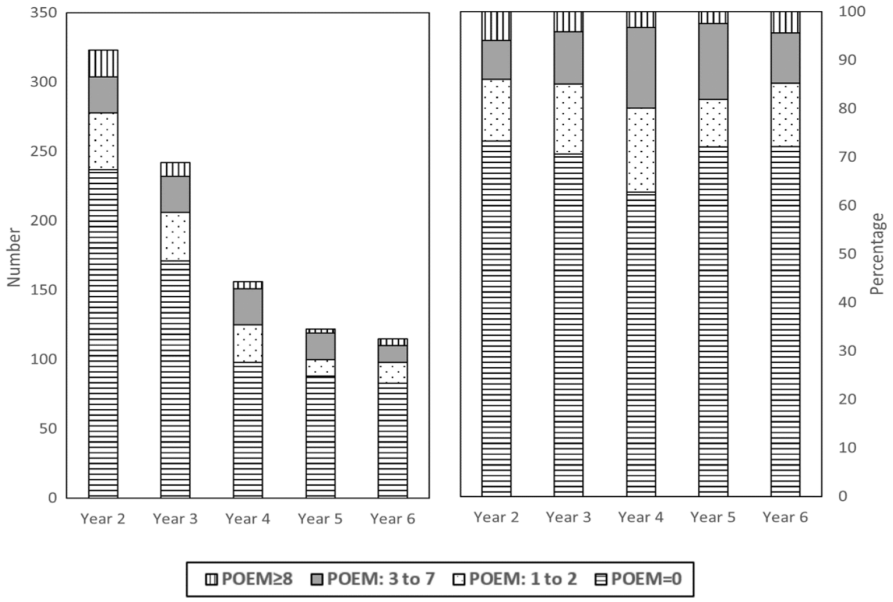

FIGURE 2 Stacked bar chart of the Patient-Oriented Eczema Measure (POEM) scores among children in the study

AD severity changing over time, and the proportion with moderate or severe AD (POEM ≥8) remained low across age.

The point agreement between parent- and physician-reported AD at Year 1 was substantial (Table S1; kappa = 0.63, 95% CI: [0.51–0.75]). There was a trend towards a decrease in the agreement over time, especially evident from Year 4 on, when there was just a fair agreement (Kappa <0.40). Compared with the point agreement, the decreasing trend of the cumulative agreement was not as sharp. At Year 6, there was still a moderate agreement between parent- and physician-reported diagnosis (kappa = 0.51 [0.43–0.60]). Figure 3A depicts the trajectories of point and cumulative agreement for AD reports over time.

Figure 3B indicates that compared to children without skin conditions (POEM score = 0), children with at least mild symptoms had a better point agreement between parent- and physician-reported AD over time. In contrast, the other two time-varying factors: other child atopic disease diagnoses and fever episodes, had no evident influence on the point agreement over time (Figure 3C,D). Similarly, the point agreement at Year 1 did not vary much by time-fixed factors (Figure 4), except with children's sex: male (substantial, kappa = 0.70 [0.56–0.85]) showed a higher agreement vs. female (moderate, kappa = 0.51 [0.30–0.72]).

Our sensitivity analysis showed that changing the lag criteria for questionnaire response from the 30-day to a 21-day (n = 363) and a 42-day (n = 517) cut-off did not largely change the trajectories of point agreement for AD reports (Figure S1). Figure S2 shows that the point agreement for parent- and physician-reported AD in SPATZ was higher than in UBCS, but there was a similar decreasing trend with increasing child age in both cohorts.

The median AD onset age was 1-year-old according to both parent and physician reports. The agreement between parent- and physician-reported AD onset age was substantial (weighted

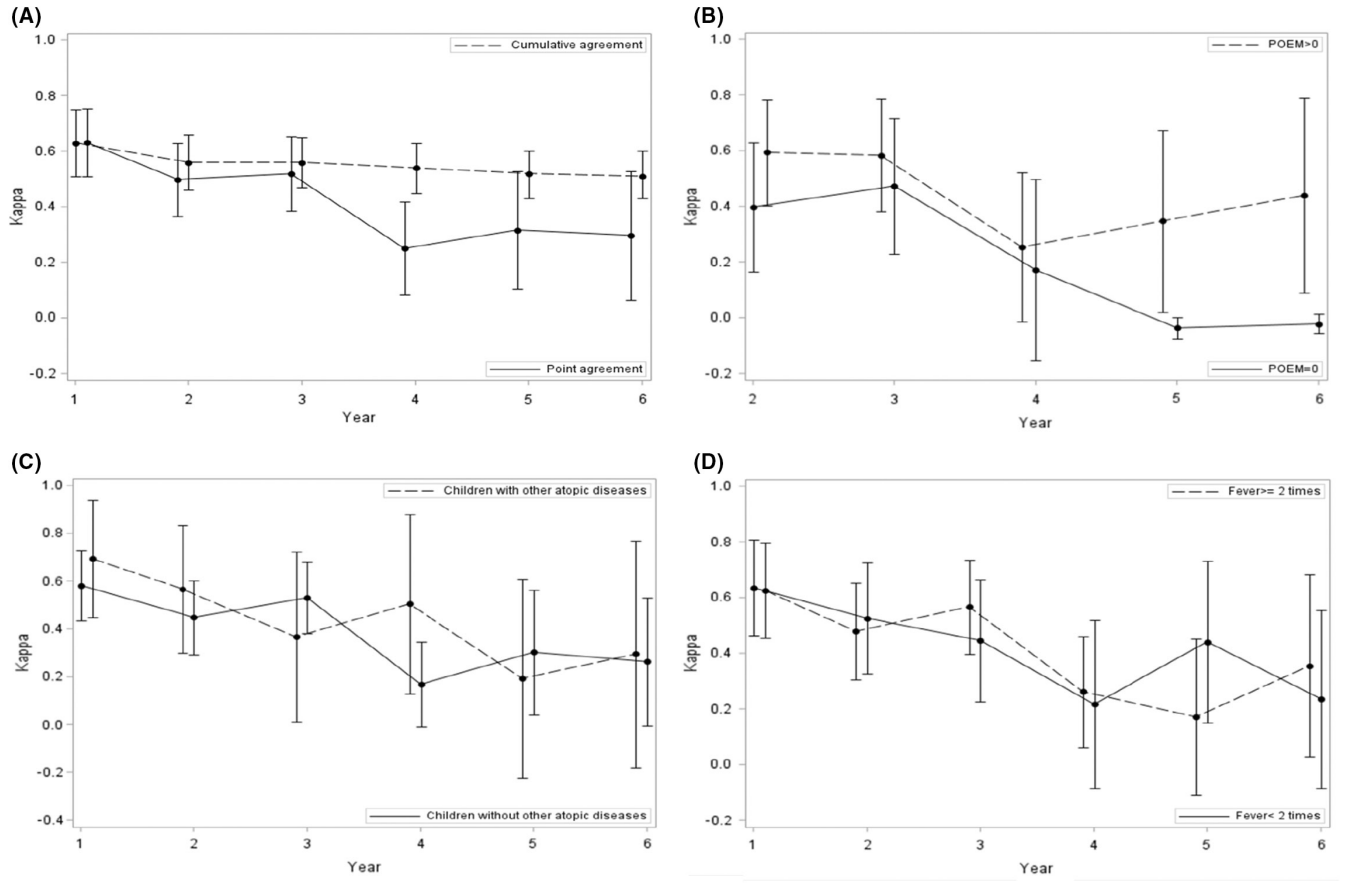

FIGURE 3 Trend of point and cumulative agreement (Kappa) between parent- and physician-reported atopic dermatitis overall (A) and point agreement stratified by Patient-Oriented Eczema Measure (POEM) scores (B), comorbid atopic diseases (C), and frequency of fever (D)

kappa = 0.63 [0.48–0.78]). The Bangdiwala's Observer Agreement Chart (Figure 5) showed that the parental reports had a bias towards delayed onset age reporting in the first 3 years, as the path of rectangles is above the diagonal line of the chart (no-bias line).

Based on these analyses, we selected child age (continuous variable), sex, and POEM score (continuous variable) as candidate factors associated with the sensitivity of parent-reported AD. Overall, there were 115 children with physician-reported AD along with POEM scores and the sensitivity of parent-reported AD was only 46.1%. The specificity, positive, and negative predictive values of parent reports were 94.9%, 63.9%, and 91.0%, respectively. Multivariable analysis showed that only the POEM score was a significant predictor for the likelihood of parent-reported AD among children with physician-reported AD (see Table S2). The model explained 44.5% of the variance of the outcome variable.

4 | DISCUSSION

Based on the Ulm SPATZ Health Study, we found that parents tended to underreport childhood AD diagnoses. The point agreement between parent- and physician-reported AD was substantial at age 1 year but declined to fair agreement from age 4 years on. The cumulative agreement also declined with age but remained moderate at the age of 6 years. Parents had a bias towards delayed reporting of the AD onset age but the agreement between parent- and physician-reported AD onset age was still substantial. The severity of AD symptoms at the time of completing parental reports was a strong determinant for the point agreement of AD diagnoses, whereas the agreement was not particularly sensitive to maternal education, parental atopic diseases, filaggrin gene mutations, and child comorbidities.

Misclassification of the exposure/outcome can bias the effect estimates either towards the null association or up- or downwards, depending on differential or non-differential misclassification, respectively. Compared with physician-reported or health claims data, parent-reported data are more prone to information bias, which may lead to inaccurate estimates of disease prevalence or exposure-disease associations.[26] While physicians can check medical records, parental reports may be more prone to recall bias and might be influenced by knowledge about diseases, understanding of clinical terms,[27] disease severity, persistence, and the length of recall period.[13,28] Therefore, parents may be less likely to report those mild AD cases. This can also explain why parents with higher education or the same disease of interest can have a better agreement with physician-reported or health claims data.[15,29]

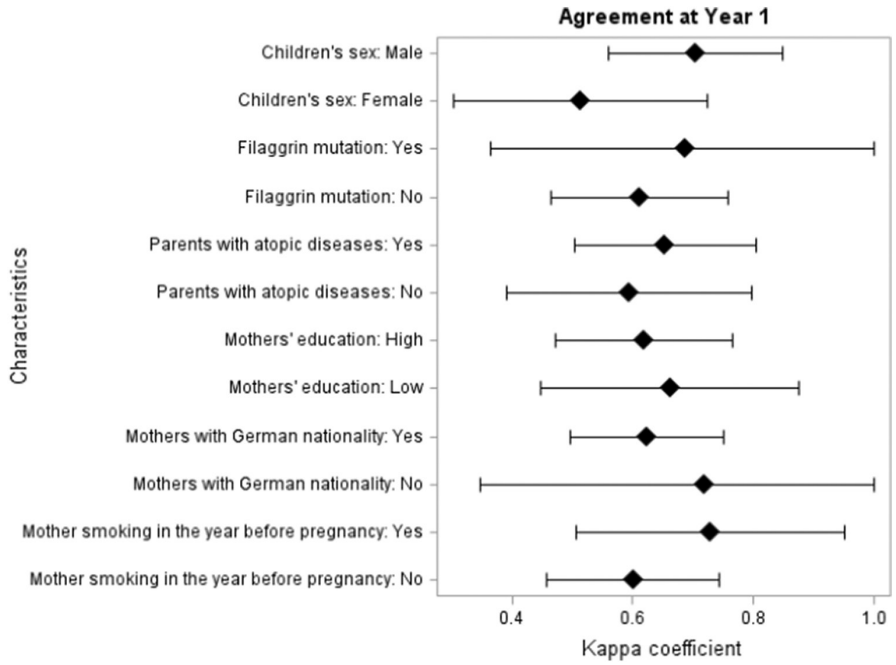

FIGURE 4 Point agreement between parent- and physician-reported atopic dermatitis at Year 1, stratified by time-fixed characteristics

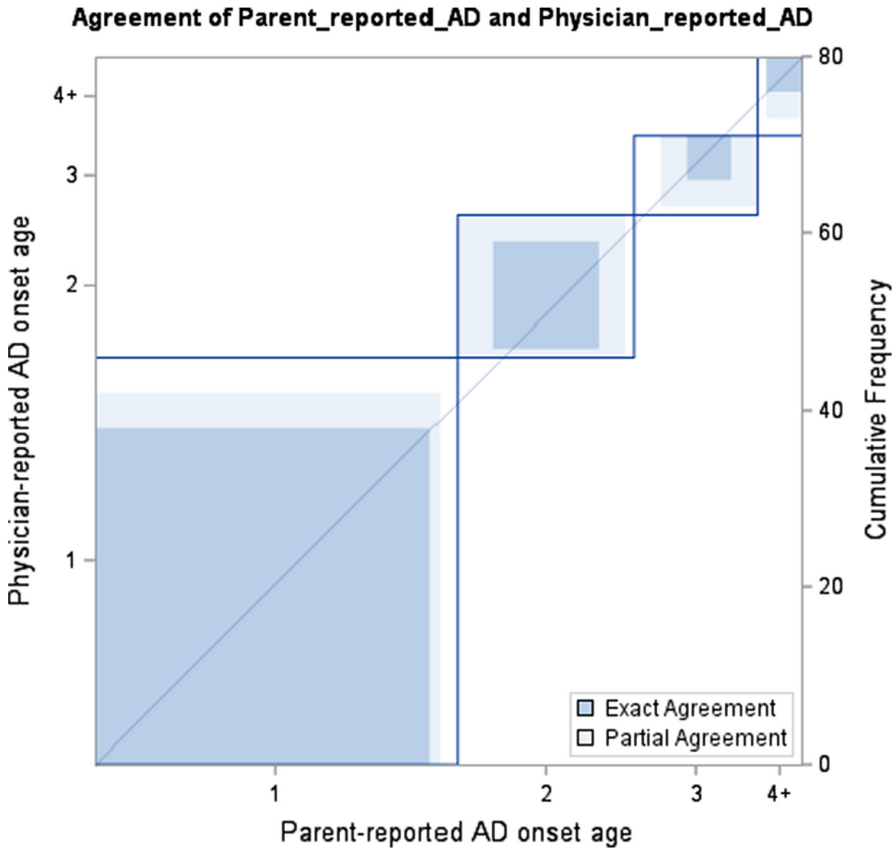

FIGURE 5 Agreement between parent- and physician-reported atopic dermatitis onset age. Abbreviation: AD, atopic dermatitis

However, self-report is a convenient, cost-effective, and important data source for studies estimating the prevalence of childhood atopic diseases and identifying risk factors. Previous studies have investigated the agreement between parental reports and patient records on asthma and food allergies.[29–31] Two studies suggested that, compared to registry data, childhood asthma was underreported by parents and the agreement was fair to moderate.[29,30] In contrast, in a study in Finland, childhood food allergies were over-reported by parents, and the agreement between parent reports and patient records was substantial.[31] The self-report bias for parent-reported asthma was mainly subject to poor recall from parents who had longer recall periods or whose children had mild symptoms; but self-report bias for parent-reported food allergies was more subject to misclassification bias as parents without professional knowledge may not easily distinguish between food allergies and food intolerance. The effect of self-report thus largely depends on features of the disease under investigation.

Childhood AD is regarded as the early manifestation and important risk factor for later onset of other atopic diseases.[32] A variety of diagnostic tools are commonly used to assess childhood AD including parent-based questionnaires and physician-based clinical criteria[6,30–32] and some previous studies compared assessments with different diagnosis criteria.[10,11] A Canadian study showed that, compared to AD diagnoses made by the study physicians, the area under the Receiver Operating Characteristic curve for parental reports at the age 1 year was 0.60.[10] There has not been a detailed investigation on the agreement between parent- and physician-reported childhood AD, except our previous ancillary analysis of the UBCS data.[12] Using SPATZ in the same setting, the present study further identified the change of agreement over age and potential factors associated with the discordance. Given that maternal education and parental atopic disease did not substantially influence the agreement and that the severity of AD symptoms was the only strong predictor, it appears plausible to assume that parents' poor recall of mild cases might be the most important source for reduced reporting of parent-reported childhood AD. When children did not have current (severe) symptoms, parents are more likely to forget the previous diagnosis. Besides, AD symptoms might not easily be distinguished from other skin symptoms for non-professionals, which might be another source of disagreement. We also observed that the males had a higher agreement if compared with the females, but the association is not significant in the GEE model. Males were reported to have more severe AD symptoms than females, which might be one of the potential explanations.[33]

These findings have implications for prevalence and association studies on pediatric AD. First, our findings highlight the particular importance of minimizing the recall bias in these studies. Researchers can consider using different data sources (e.g., claims data or biomarker studies) or adjusting for AD severity.[26] Second, our findings show that the utility of parent-reported data also depends on the study purpose. If a study requires a simple retrospective measure of childhood AD history, using parent-reported data may be an option, though suboptimal, as our results showed that the cumulative agreement between parent and physician reports could stay moderate. If the study purpose is to analyze the natural history or trend of childhood AD, researchers should be more cautious as parent-reported data are more likely to be biased among children aged older than 4 years; and the tendency towards a delayed report of AD onset by parents should be noticed.

Our study has some limitations. Approximately 50% of the baseline participants had insufficient data at age 6 years, although the basic characteristics were comparable to baseline. We only compared reported diagnoses and did not use a specific questionnaire for atopic dermatitis symptoms,[6] which may influence the estimate of agreement level. The children's primary care physician reports we used seem closer to the "truth" than parental reports; but in German health care, children may be diagnosed with AD by clinicians other than the primary care physicians and it is possible that not all information were captured; although most German children participate in the national routine health examination schedule in Germany (U-examination) and their physicians can regularly obtain their health status.[34] Besides, there might be uncontrolled factors or poor precision in the study, e.g., we assessed diagnoses in the past 12 months of life rather than a more precise time of diagnosis and we only had yearly assessments. Improving that precision could lead to a higher agreement.

In conclusion, compared with physician reports, parents tend to underreport early life AD diagnoses. The disagreement level between parent and physician reports increases with children's age, which may be largely attributed to the change of AD severity over time. The use of parent-reported data is likely to miss a substantial portion of mild AD cases at an early age.

AUTHOR CONTRIBUTIONS

Zhuoxin Peng: Conceptualization (equal); Formal analysis (lead); Investigation (equal); Methodology (equal); Writing –original draft (lead); Writing – review & editing (supporting). **Stefanie Braig:** Data curation (supporting); Project administration (supporting); Writing – review & editing (supporting). **Deborah Kurz:** Data curation (supporting); Project administration (supporting); Writing – review & editing (supporting). **Johannes M. Weiss:** Conceptualization (supporting); Data curation (supporting); Investigation (supporting); Resources (supporting); Writing – review & editing (supporting). **Stephan Weidinger:** Conceptualization (supporting); Data curation (supporting); Investigation (supporting); Resources (supporting); Writing – review & editing (supporting). **Hermann Brenner:** Conceptualization (supporting); Funding acquisition (supporting); Investigation (equal); Project administration (supporting); Resources (supporting); Writing – review & editing (supporting). **Dietrich Rothenbacher:** Conceptualization (supporting); Data curation (equal); Funding acquisition (equal); Investigation (equal); Project administration (supporting); Resources (equal); Writing – review & editing (supporting). **Jon Genuneit:** Conceptualization (equal); Data curation (equal); Formal analysis (supporting); Funding acquisition (lead); Investigation (equal); Methodology (supporting); Project administration (lead); Resources (equal); Writing – original draft (supporting); Writing – review & editing (supporting).

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CONFLICT OF INTEREST

Jon Genuneit is the project manager of research grants from Danone Nutricia Research to both Ulm University and Leipzig University in relation to studies of the composition of breast milk.

PEER REVIEW

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REFERENCES

1. Wei X, Huang P, Gao C, et al. Associations of maternal weight status with the risk of offspring atopic dermatitis and wheezing by 1 year of age. *Pediatr Allergy Immunol*. 2022;33:e13703.
2. Langan SM, Irvine AD, Weidinger S. Atopic dermatitis. *Lancet*. 2020;396:345-360.
3. Genuneit J, Seibold AM, Apfelbacher CJ, et al. Overview of systematic reviews in allergy epidemiology. *Allergy*. 2017;72:849-856.
4. Silverberg JI, Barbarot S, Gadkari A, et al. Atopic dermatitis in the pediatric population: A cross-sectional, international epidemiologic study. *Ann Allergy Asthma Immunol*. 2021;126:417-428. e2.
5. Peroni DG, Piacentini GL, Bodini A, Rigotti E, Pigozzi R, Boner AL. Prevalence and risk factors for atopic dermatitis in preschool children. *Br J Dermatol*. 2008;158:539-543.
6. Lusignan S, Alexander H, Broderick C, et al. The epidemiology of eczema in children and adults in England: A population-based study using primary care data. *Clin Exp Allergy*. 2021;51:471-482.
7. Raimondo A, Lembo S. Atopic dermatitis: epidemiology and clinical phenotypes. *Dermatol Pract Concept*. 2021;11:e2021146.
8. Infante-Rivard C, Jacques L. Empirical study of parental recall bias. *Am J Epidemiol*. 2000;152:480-486.
9. Jøhnke H, Vach W, Norberg LA, Bindslev-Jensen C, Høst A, Andersen KE. A comparison between criteria for diagnosing atopic eczema in infants. *Br J Dermatol*. 2005;153:352-358.
10. Dharma C, Lefebvre DL, Tran MM, et al. Diagnosing atopic dermatitis in infancy: questionnaire reports vs criteria-based assessment. *Paediatr Perinat Epidemiol*. 2018;32:556-567.
11. Akan A, Dibek-Mısırlıoğlu E, Civelek E, Vezir E, Kocabaş CN. Diagnosis of atopic dermatitis in children: comparison of the Hanifin-Rajka and the United Kingdom Working Party criteria. *Allergol Immunopathol (Madr)*. 2020;48:175-181.
12. Genuneit J, Braig S, Brandt S, et al. Infant atopic eczema and subsequent attention-deficit/hyperactivity disorder – A prospective birth cohort study. *Pediatr Allergy Immunol*. 2014;25:51-56.
13. Bergmann MM, Jacobs EJ, Hoffmann K, Boeing H. Agreement of self-reported medical history: comparison of an in-person interview with a self-administered questionnaire. *Eur J Epidemiol*. 2004;19:411-416.
14. Kim Y-Y, Park JH, Kang H-J, Lee EJ, Ha S, Shin S-A. Level of agreement and factors associated with discrepancies between nationwide medical history questionnaires and hospital claims data. *J Prev Med Public Health*. 2017;50:294-302.
15. Hansen H, Schäfer I, Schön G, et al. Agreement between self-reported and general practitioner-reported chronic conditions among multimorbid patients in primary care – results of the MultiCare Cohort Study. *BMC Fam Pract*. 2014;15:39.
16. Spergel JM, Paller AS. Atopic dermatitis and the atopic march. *J Allergy Clin Immunol*. 2003;112:S118-S127.
17. Hoyer A, Rehbinder EM, Färdig M, et al. Filaggrin mutations in relation to skin barrier and atopic dermatitis in early infancy. *Br J Dermatol*. 2021;186:544-552.
18. Chiriac AE, Popescu R, Butnariu L, Murgu A, Foia L, Azoicai D. Mutations of filament-aggregating protein gene in Romanian children diagnosed with atopic dermatitis. *Exp Ther Med*. 2020;20:212.
19. Silverberg JI, Gelfand JM, Margolis DJ, et al. Severity strata for POEM, PO-SCORAD, and DLQI in US adults with atopic dermatitis. *Ann Allergy Asthma Immunol*. 2018;121:464-468. e3.
20. Charman CR, Venn AJ, Ravenscroft JC, Williams HC. Translating Patient-Oriented Eczema Measure (POEM) scores into clinical practice by suggesting severity strata derived using anchor-based methods. *Br J Dermatol*. 2013;169:1326-1332.
21. Kido-Nakahara M, Nakahara T, Yasukochi Y, Ulzii D, Furue M. Patient-oriented eczema measure score: a useful tool for web-based surveys in patients with atopic dermatitis. *Acta Derm Venereol*. 2020;100:adv00159.
22. Logan CA, Bornemann R, Koenig W, et al. Gestational weight gain and fetal-maternal adiponectin, leptin, and CRP: results of two birth cohorts studies. *Sci Rep*. 2017;7:41847.
23. Bangdiwala SI, Shankar V. The agreement chart. *BMC Med Res Methodol*. 2013;13:97.
24. Zheng B. Summarizing the goodness of fit of generalized linear models for longitudinal data. *Stat Med*. 2000;19:1265-1275.
25. Ballinger GA. Using generalized estimating equations for longitudinal data analysis. *Organ Res Methods*. 2004;7:127-150.
26. Althubaiti A. Information bias in health research: definition, pitfalls, and adjustment methods. *J Multidiscip Healthc*. 2016;9:211-217.
27. Elston DM. Participation bias, self-selection bias, and response bias. *J Am Acad Dermatol*. 2021;18. doi: 10.1016/j.jaad.2021.06.025 Online ahead of print.
28. Mortz CG, Andersen KE, Bindslev-Jensen C. Recall bias in childhood atopic diseases among adults in the Odense Adolescence Cohort Study. *Acta Derm Venereol*. 2015;95:968-972.
29. Omand JA, Maguire JL, O'Connor DL, et al. Agreement between a health claims algorithm and parent-reported asthma in young children. *Pediatr Pulmonol*. 2019;54:1547-1556.
30. Hansen S, Strøm M, Maslova E, Mortensen EL, Granström C, Olsen SF. A comparison of three methods to measure asthma in epidemiologic studies: results from the Danish National Birth Cohort. *PLoS One*. 2012;7:e36328.
31. Tuokkola J, Kaila M, Pietinen P, Simell O, Knip M, Virtanen SM. Agreement between parental reports and patient records in food allergies among infants and young children in Finland. *J Eval Clin Pract*. 2008;14:984-989.
32. Yang L, Fu J, Zhou Y. Research Progress in Atopic March. *Front Immunol*. 2020;11:1907.
33. Amat F, Soria A, Tallon P, et al. New insights into the phenotypes of atopic dermatitis linked with allergies and asthma in children: An overview. *Clin Exp Allergy*. 2018;48:919-934.
34. Weyers S, Höhmann A, Götz S, Kreffter K. Reminder system for health screening in early childhood - an analysis regarding different social circumstances. *BMC Pediatr*. 2021;21:438.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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